



One new species, two generic synonyms and eight new records of Thripidae from China (Thysanoptera)

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Abstract

Baliothrips sunae sp.n. is described from eastern China, and eight thripid species are newly recorded from China. One species is shared with Europe, three with Australia and four with southeast Asia. *Chilothrips* Hood is synonymized with *Oxythrips* Uzel, and *Graminothrips* Zhang & Tong is synonymized with *Organothrips* Hood.

Key words: *Edissa*, *Ensiferothrips*, *Indusiothrips*, *Moundinothrips*, *Striathrips*

Introduction

The land area of China, at more than 9.5 million km², approximates to that of the U.S.A. but extends south into tropical areas. The resulting diversity of biomes, from the cold northern forests and grasslands, to the rich tropical forests of the south, and the extensively dissected topography of the southwest, supports a highly diverse flora and fauna. This diversity is clearly reflected in the Thysanoptera fauna, with a few endemics (Li *et al.* 2018a), but European taxa in the north (Mirab-balou *et al.* 2014), Asian taxa in the south (Li *et al.* 2018b), and several from Australia reported here from southern China. Until recently the study of Thysanoptera in China has involved limited exploration, but in the past 10 years many additional taxa have been newly recorded. The basic taxonomic reference works for thrips of China, apart from many small papers, are one revisionary study (Han 1997) and a checklist (Mirab-balou *et al.* 2011), but both need considerable revision. A web-based identification and information system to almost 100 genera of Thripidae recorded from China has been prepared, and the data presented here is made available to facilitate publication of that system.

From a biogeographical viewpoint, the most significant amongst these new records is the number of species that are shared between southern China and northern Australia. The Australian fauna is commonly viewed as being rather isolated and unique, with a particularly high level of endemism (Austen *et al.* 2004). However, many thrips as members of the aerial plankton are readily distributed by wind systems, and such species can be widely dispersed (Mound 1983). Thrips species that are host-specific, such as those that breed only on *Acacia* or *Casuarina* species in Australia, are likely to be restricted in their distributions by the distributions of these plants. But the three from Australia that are here newly recorded from southern China are all associated with grass leaves. It seems likely that thrips generalist feeders on Poaceae leaves, also many of the fungus-feeders in leaf-litter, will be found to exhibit wider natural distributions than workers have previously assumed.

Acknowledgments and abbreviations

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XiaoLi, Dang LiHong and Wang Jun. The first author is grateful to China Scholarship Council for financial support to study at CSIRO, Canberra. Depositories of specimens listed here are NWAUFU (Northwest A & F University, Yangling, China); SCAU (Insect Collection, South China Agricultural University, Guangzhou); YAU (Plant Protection College, Yunnan Agricultural University, Kunming); ANIC (Australian National Insect Collection, CSIRO, Canberra). The following abbreviations are used here: S1, S2, S3 refer to posteromarginal setae on any segment, numbered from the midline outward; MD setae—mid-dorsal pair of setae on tergite IX of many Thripidae. Nomenclatural details for all taxa mentioned here are available in ThripsWiki 2018.

***Anaphothrips incertus* (Girault)**

(Figs 1–2)

Described from Australia in the genus *Limothrips*, this grass-living species has previously been known only from Australia where it is widespread in the warmer eastern parts of that continent (Pitkin 1978). It is here recorded from China for the first time from the specimens listed below. A full description of the species was provided by Mound and Masumoto (2009). Although similar in general appearance to *A. populi* Zhang & Tong, with which it shares the light brown colour of body and fore wings, a long comb on tergite VIII, and similar body sculpture, it is distinguished by the 8-segmented antennae, ocellar setae pair III more widely separated (Fig. 1), tergite IX distinctly longer, and antennal segments III and IV variably yellowish. The male listed below from Yunnan has the strongly C-shaped sternal pore plates (Fig. 2) that are typical of so many species in this genus, and tergite IX bears a pair of short stout thorn-like setae. The two females from Tibet are the first known micropterae of this species. The fore wings are shorter than the thorax width, the ocelli are absent, and the four postocular setae are in a transverse row, but in other character states it is similar to macropterae from Australia.

New records: CHINA, Yunnan, Shi Lin County, 4 females 5 males from grasses, 10.ix.2015 (Li YJ & Yang CW), in YAU and ANIC; Puer City, Jinggu County, 13 females from *Phragmites communis*, 9.viii.2015 (Li YJ), in YAU. Guizhou, Xingyi City, 3 females from *Themeda caudata*, 6.xi.2017 (Kong B & Wu C), in YAU. Guangxi, Langping, 2 females from bamboo, 25.vii.2014 (Man Yue), in NWAUFU. Tibet, Medog County, 2 micropterous females from grass, 15.vii.2016 (Niu MM), in NWAUFU.

***Baliothrips sunae* sp.n.**

(Figs 5–10)

Female macroptera: Body, femora and antennal segments I–II uniformly brown; tarsi yellow, also distal half of tibiae; antennal segments III–IV mainly yellow, V–VII light brown; fore wings banded, basal third including clavus pale, then a short dark band, a slightly longer pale band, with wing apex dark. Antennae 7-segmented; segment I without paired dorso-apical setae; III and IV each with sense cone short and forked, sense cone Y-shaped on III; apex of V and base of VI broadly transverse (Fig. 10); III–VI with microtrichia on both surfaces. Head slightly longer than width across cheeks with eyes large and swollen (Fig. 5); longitudinal row of tuberculate sculpture anterior to first ocellus, ocellar triangle weakly sculptured, posterior third of head transversely striate/reticulate; ocellar setae pair I absent, pair II wide apart long but curved, pair III on margin of triangle; five pairs of long postocular setae, pair I longest, not arranged in a straight row; maxillary palps 2-segmented. Pronotum transverse, with no discal setae or sculpture medially; four pairs of posteromarginal setae, S1 longer than S2, but S3 and S4 (posteroangulars) longest (Fig. 8); one pair of midlateral setae long and stout; anterior margin with 4–5 pairs of fine setae. Mesonotum with no sculpture or campaniform sensilla on anterior third (Fig. 6); median pair of setae far from posterior margin; mesofurca with weak spinula. Metanotum with irregular longitudinal striae, median setae far from anterior margin; metafurca without spinula. Prosternal basantra membranous, without setae; ferna robust and continuous medially; prospinasternum transverse and slender. Tarsi 2-segmented; hind tibiae with setae on distal half longer than width of tibia. Fore wing first vein with 4–5 widely spaced setae near base, 2 widely spaced setae near apex; second vein with about 8 widely spaced setae; clavus with 4 veinal and one discal setae. Tergite I covered with transverse irregular reticulate sculpture, median setae minute; II–VIII with no sculpture medially between setae S1, without craspeda (Fig. 7); VI–VIII with paired ctenidia ending at discal setae S3; IV–V

with weak ctenidia; posterior margin of VIII with a few minute microtrichia on lateral thirds; IX with anterior campaniform sensilla absent (Fig. 7); MD setae stout and extending beyond tergal margin, marginal setae long and extending beyond body apex; X with median split almost complete, major setae nearly twice length of segments. Sternites II–VII with transverse reticulation (Fig. 9), II with two pairs of marginal setae, III–VII with three pairs; S1 on VII in front of posterior margin, but close to or on margin on II–VI.

Measurements (holotype female in microns). Body length 1600. Head, length 125 (not horizontal); width across cheeks 140; width across eyes 175. Pronotum, length 130; width 210; posteromarginal S1–S4 setae 35, 25, 60, 50. Metanotum median setae 25. Fore wing length 900. Tergite IX, length 80; MD setae 55; S1 setae 100. Tergite X length 90; S1 setae 140.

Male: Not known.

Comments: This new species is referred to the genus *Baliothrips* with some hesitation, but the alternative of placing each of the three species involved into a separate genus de-emphasises their apparent relationships. In a key to genera related to *Thrips* that are associated with grasses, Bhatti and Mound (1980) provided four character states by which they diagnosed *Baliothrips*. Two of these are found in this new species, but two are absent. Marginal setae S1 on sternites III–VI are submarginal in both *dispar* (Haliday) and *kroli* (Schille), and in both of them sternite II bears three pairs of marginal setae of which pair S1 is submarginal. Neither of these character states occurs in this new species, although all three species share a similar condition of the fore wing clavus with four veinal setae, and chaetotaxy of the hind tibiae with two or three unusually long setae. Moreover, *sunae* is particularly similar to *dispar*, the type species of *Baliothrips*, in the 2-segmented maxillary palps, the shape and chaetotaxy of the head, the metanotal sculpture, and many other details including the banded fore wings. The new species differs from the previous two species in the genus in the uniformly pale colour of the wing base and clavus, the absence of campaniform sensilla on the metanotum and first abdominal tergite, and the presence of a weak mesosternal spinula.

Material studied. Holotype female, **CHINA, Zhejiang**, ShuangXikou, from grasses, 27.v.2017 (Niu MM), in NWAUFU.

Paratypes, 4 females collected with holotype, two in NWAUFU; one in ANIC; one in BMNH.

***Dictyothrips betae* Uzel**

(Figs 3–4)

Described from central Europe, and recorded widely from northern Italy to Denmark and across eastern Europe to Siberia, this species is presumably Holarctic in distribution. It is recorded here for the first time from China, in the far north of this country. Despite being so widely recorded, zur Strassen (2003) indicated that the host plant remained unknown. However, Ciuffo *et al.* (2010) recorded this thrips as a vector of a species of tospovirus on two species of *Polygonum* in Italy. *Dictyothrips* was listed by Masumoto and Okajima (2017) as a member of the *Anaphothrips* group, because of the lack of long setae on the pronotum. Within that group, it is distinguished because of the presence of discal setae on the median sternites, and the presence of a craspedum on tergites II–VII. The only member of the genus is yellow in colour, with characteristic delicate markings within the sculptured reticles on the body (Fig. 3), tergite IX with no anterior campaniform sensilla but short stout major setae (Fig. 4), ocellar setae III small and close together within the ocellar triangle, and antennal segments III–VI with prominent rings of microtrichia on both surfaces.

New records: **China, Inner Mongolia**, Chifeng, 2 females from unidentified Poaceae, 6.vii.2014 (Zhang SM), in NWAUFU.

***Edissa steineriae* Mound**

(Fig. 11)

The genus *Edissa* is a member of the subfamily Dendrothripinae, and is particularly unusual within that group in being associated with the leaves of Poaceae rather than with broad leaved plants. The genus comprises two species, of which one is known only from South Africa. However, the second species, *steineriae*, was described from the

rainforest area of north eastern Australia and also recorded from Thailand and the Bonin Islands of Japan (Mound 1999). Here it is recorded from a similar ecological area in southern China, and is thus another example of the relationship of the thrips fauna of northern Australia to that of southeast Asia. This is a pale yellow species with very slender wings, and without prominent setae, but with a dark area on the anterior margin of the head (Fig. 11). It is unusual amongst the Dendrothripinae in having 7-segmented antennae with simple sense cones in segments III and IV.

New records: **China, Guangdong**, Beitan, Zhanjiang City, 2 females from grass, 15.i.2015 (Zhaohong Wang), in SCAU.

***Ensiferothrips wallacei* Mound & Tree** (Fig. 15)

The genus *Ensiferothrips* comprises four species. Three of these are from Australia of which one is also known from New Caledonia and Norfolk Island. In contrast, *wallacei* was described from four females taken by insecticide fogging of an unidentified forest tree in Sulawesi, Indonesia. This species is here recorded from China for the first time, and the plant from which it was collected is closely related to the known host plants of two species in this genus (Mound & Tree 2016). In structure, it is very similar to the type species of the genus, *E. primus*, with which it shares curiously large dark, grooved major setae on the head and pronotum (Fig. 15).

New records: **China, Hainan**, Danzhou, Tropical Botanical Garden, 1 female from *Maclura tricuspidata* [Moraceae], 19.x.2014 (Chao Zhao), in SCAU.

***Indusiothrips seshadrui* Priesner** (Fig. 14)

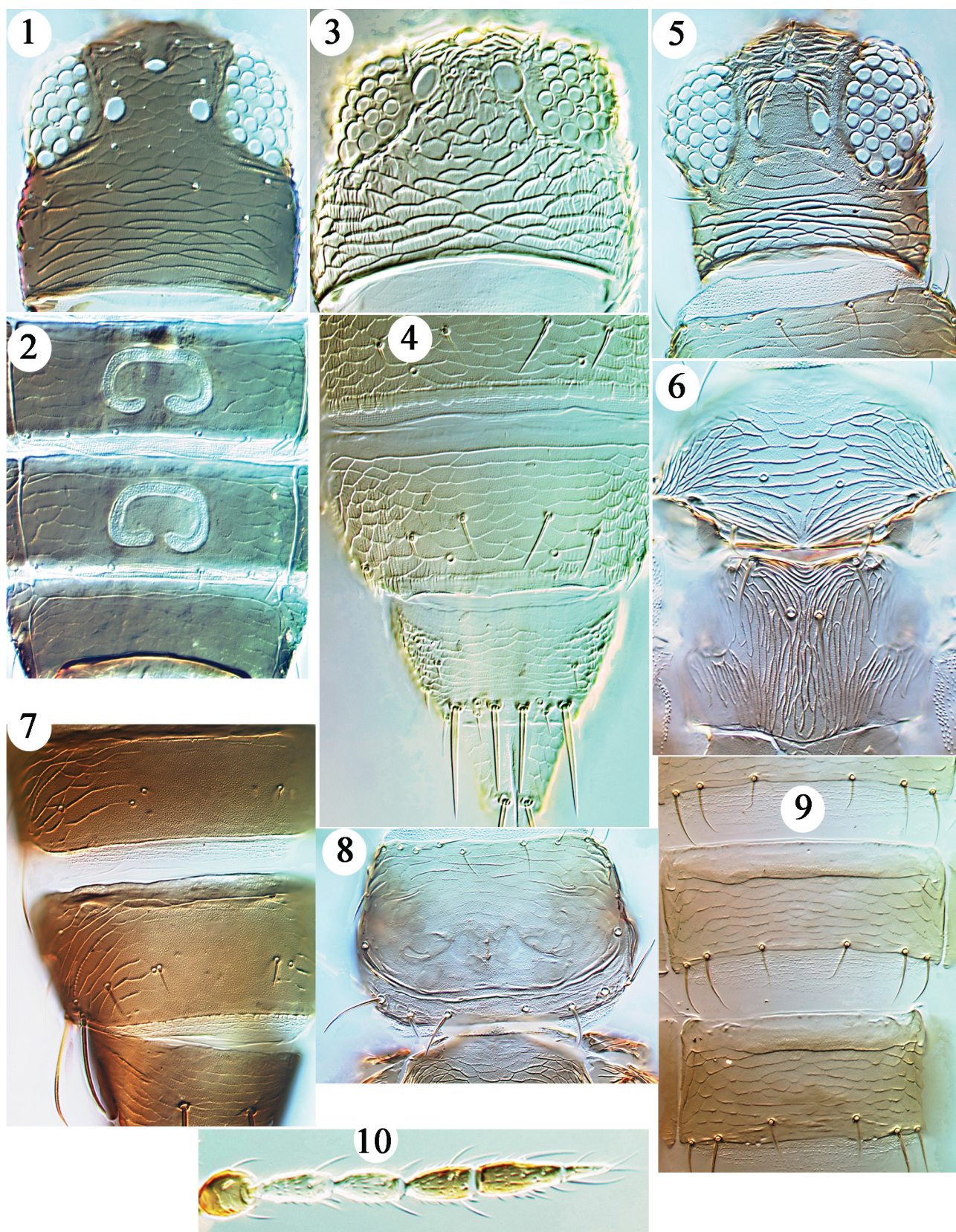
Until recently, this species was known only from specimens collected in southern India (Wilson 1975). However, in 2016 it was collected on Oahu in the Hawaiian Islands (Mound *et al.* 2017), and the females listed below from southern China represent the third published record of the species. Presumably it is widespread in Asia in association with the fronds of one or more species of ferns. The only other member of the genus, *nakaharai*, is known from members of the fern family Polypodiaceae in Japan. These two species are small pale thrips with the dorsal surface of the head reticulate (Fig. 14).

New records: **China, Jiangxi**, Anfu County, Taishan Town, Mt. Wugongshan, four females from grass, 12.viii.2016 (Zhaohong Wang), in SCAU. **Guizhou**, Zunyi City, 4 females from *Mallotus repandus*, 16.viii.2016 (Yan XQ); Xingyi City, 2 female from *Viburnum chinshanense*, 10.ix.2017 (Li YJ), in YAU. **Yunnan**, Yuxi City, Tonghai County, Xiushan Park, 15 females, 1 male from *Dryopteris* sp., 22.v.2017 (Zhang HR & Li YJ), in YAU. **Chongqing**, Xiushan County, 7 females from fern, 9.viii.2017 (Li YJ), in YAU.

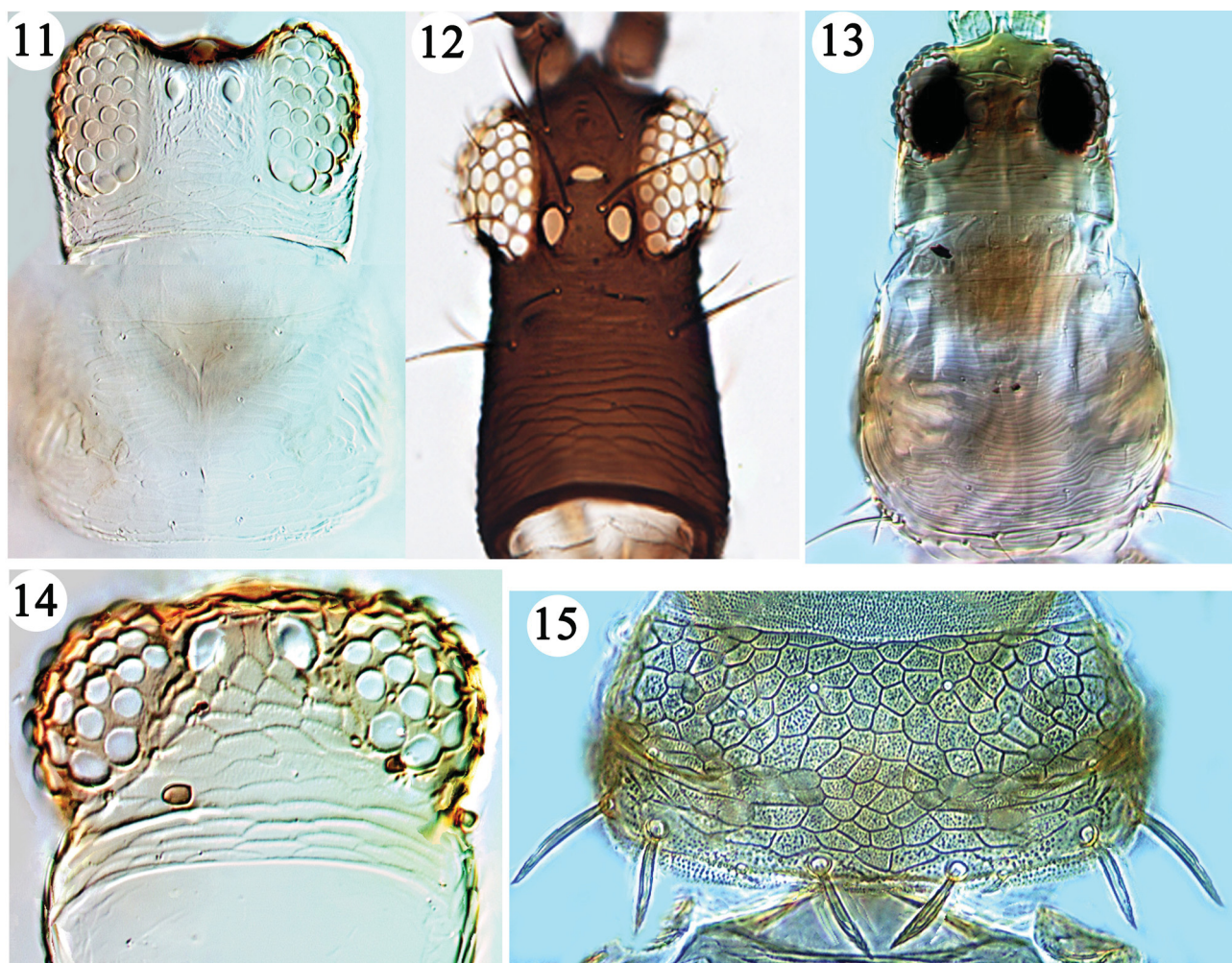
***Moundinothrips robustus* (Bhatti)** (Fig. 12)

The only species in this genus has been known from a single female collected in Cibodas Botanic Gardens, Bogor, Java. The species is similar in general appearance (Fig. 12) to members of the genus *Taeniothrips*, but the first antennal segment bears a pair of dorso-apical setae, the pronotum has only a single pair of postero-marginal setae, the meso and the metasternal furca both have a well-developed spinula, and sternite VII bears only two pairs of marginal setae. These character states suggest that the *Taeniothrips*-like appearance is not an indication of any systematic relationship. The presence in China of a species from Java is not particularly surprising, and further members of the *Taeniothrips* complex (Mound *et al.* 2012) are likely to be discovered in southern China.

New records: **China, Yunnan**, all collected by Zhang HR & Li YJ: Yuxi City, Mopan Mountain, 1 female from unknown plant, 17.iii.2015; Wuding County, Lion Mountain, 3 females from fern, 14.v.2017; Shilin County, 1 female from *Photinia serrulata*, 15.iii.2017, in YAU.



FIGURES 1–10. Thripidae from China. *Anaphothrips incertus* 1–2: (1) head; (2) male sternites V–VII. *Dictyothrips betae* 3–4: (3) head; (4) tergites VII–X. *Baliothrips sunae* sp.n. 5–10: (5) head; (6) meso and metanota; (7) tergites VII–IX; (8) pronotum; (9) sternites V–VII; (10) antenna.



FIGURES 11–15. Thripidae from China. (11) *Edissa steinerae*, head and pronotum (12) *Moundinothrips robustus* head. (13) *Striathrips sulcatus*, head and pronotum. (14) *Indusiothrips seshadrii*, head. (15) *Ensiferothrips wallacei*, pronotum.

***Organothrips* Hood**

Organothrips Hood, 1940: 423.

Graminothrips Zhang & Tong, 1992: 82. **Syn.n.**

One female and one male of *Graminothrips cyperi*, the type species of that genus, have been compared with both sexes of *Organothrips indicus*, a close relative of *O. bianchi*, the type species of that genus. These two species share the following unusual character states: head projecting in front of eyes; ocellar setae I absent; maxillary palps 2-segmented; antennal segments without microtrichia, III and IV with simple sense cones, segment I with paired dorso-apical setae; prosternal basantra with two setae; fore tibia inner apex with expanded fimbriate seta; tarsi 1-segmented; tergite posterior margins laterally with row of microtrichia; sternite II with three pairs of marginal setae; male sternites with multiple small pore plates. Moreover, there are no significant character states by which *cyperi* and *indicus* could be considered members of different genera. As a result, *Graminothrips* is here considered a synonym of *Organothrips*. In this genus, the two most well-known species, *bianchi* and *indicus*, are closely similar in structure (Mound 2000). They are both associated with the leaves of aquatic plants, often living actually below the water surface in the mucilage on stems of *Colocasia*, *Eichornia* and *Typha* (Bhatti *et al.* 1998; Mound 2000). In contrast, the third species placed in the genus, *O. wrighti*, was taken from grasses at a damp site. Similarly, *G. cyperi* and *G. longisetosus* were described from specimens taken from non-aquatic plants, the first from *Cyperus* and the second from grass. In contrast to the two semi-aquatic species, *O. wrighti* has the first

antennal segment reduced in size and lacking paired dorso-apical setae, and moreover this species has only two pairs of marginal setae on the second abdominal sternite. Of the two specimens of *cyperi* that have been studied, paired dorso-apical setae are clearly present on the first antennal segment of the male, but on the female these setae are minute and could be seen clearly only by using a X100 objective lens. The relationships of *G. longisetosus* are more difficult to assess. Despite sharing several character states with the other species of *Organothrips* it differs in the following: ocellar setae I present; prosternal basantra without any setae; tarsi 2-segmented. Moreover, according to Prof. Tong XiaoLi (in litt. ii.2018), paired dorso-apical setae are either present or absent among specimens of this species that have become available to him subsequent to the original description. The following **new combinations** are required as a result of the above generic synonymy: *Organothrips cyperi* (Zhang & Tong); *Organothrips longisetosus* (Zhang & Tong).

***Oxythrips* Uzel**

Oxythrips Uzel, 1895: 133.

Chilothrips Hood, 1916: 119. **Syn.n.**

The genus *Chilothrips* was erected for a species from eastern North America living in the male cones of *Pinus* trees, and subsequently two further species from California, and four from China were added (ThripsWiki 2018). Problems with distinguishing this genus from *Oxythrips*, the European type species of which also breeds in *Pinus*, were discussed by Stannard (1973), who concluded that “this American genus is but a close side-shoot from *Oxythrips*”. The key to genera of the *Anaphothrips* group by Masumoto and Okajima (2017) distinguished *Chilothrips* as having: fore tibia with a stout apical seta; female with mouth cone long; tergite X twice as long as IX. In contrast, *Oxythrips* species have: fore tibia with a thin apical seta; female with mouth cone usually short; tergite X usually subequal to IX. This separation is clearly not robust, and is further weakened because males have a smaller mouth cone than females. Moreover, females of the common European species, *Oxythrips bicolor*, another species from *Pinus* male cones, have a large stout mouth cone, and tergite X is twice as long as tergite IX. This species could equally well be placed in *Chilothrips*. However, intersex individuals recorded commonly in northern Scotland (Mound 1971) are interpreted as evidence that *bicolor* interbreeds with *ajugae* Uzel, the type species of *Oxythrips*. These two species are therefore presumably closely related, and should not be placed in separate genera. Studies in China (Cui *et al.* 2017) on *Chilothrips strobilus*, have indicated remarkable variation in the length and shape of tergite X within a single population from *Pinus*, from about 1.2 times as long as basal width to at least 3.0 times. In view of the many character states shared by species that have been placed in these two genera, including the shared host association with *Pinus* male cones in several species, these two are here formally synonymized. As a result, the following **new combinations** are established: *Oxythrips hangzhouensis* (Hu & Feng); *Oxythrips jiuxiensis* (Mirab-balou, Chen & Tong); *Oxythrips occidentalis* (Stannard); *Oxythrips pini* (Hood); *Oxythrips rotrameli* (Stannard); *Oxythrips strobilus* (Tong & Zhang); *Oxythrips yamatensis* (Kudo).

***Striathrips sulcatus* Mound**

(Fig. 13)

This species has previously been known only from a single female taken in a rainforest area of Queensland in north eastern Australia (Mound 2011). It is the only species recognised in the genus, and the relationships to other Thripinae are far from clear. The transverse sculpture lines on the head and body (Fig. 13), the well-developed lobed tergal craspeda, and the presence of a single dorso-apical seta on the first antennal segment are remarkable features of this thrips. It is here recorded from China for the first time, and represents yet another interesting link between the thrips fauna of tropical Asia and northern Australia.

New records: **China, Guangdong**, Zhanjiang City, Beitan, 4 females from grass, 15.i.2018 (Zhaohong Wang), in SCAU and ANIC.

Thrips atactus Bhatti

Described originally from a single female taken in West Bengal, India, this species has been intercepted by quarantine in Japan several times on the flowers of *Eryngium foetidum* [Apiaceae] from Laos and Thailand, as well as on roses from Nepal. In publishing that information, Masumoto and Minoura (2011) provided a fully illustrated description, indicating that this species is closely similar to *Thrips palmi* in structure. However, in contrast to that and other related species, it is distinctively bicoloured. Abdominal segments II–VII are dark brown, and the mesothorax and metanotum are also brown; in contrast, the head and pronotum, the posterior half of the metathorax, also abdominal segments IX–X are yellow. The fore wing is largely dark, with a paler area sub-basally and at the apex. The species is here recorded from China for the first time on the specimens listed below.

New records: **China, Sichuan**, Zhaojue, 6 females from flowers of unidentified Asteraceae, 7.vii.2015 (Zhang SM), in NWAUFU. **Guangdong**, Guangning County, Baodingshan, 20 females and 5 males from leaves of *Hydrocotyle sibthorpioides* [Apiaceae], 16.vii.2014 (Wang ZH), in SCAU.

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